



Knowledge, Attitude, And Practice Regarding Orthodontic Separators Among Orthodontists And Patients: A Cross-Sectional Questionnaire-Based Study

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Abstract

Background: Orthodontic separators are essential components in fixed orthodontic treatment, primarily utilized to create interproximal space for band placement. Despite their widespread use, limited data exist on knowledge, attitudes, and practices (KAP) among orthodontists and patients, as well as on the perceptual gaps between these two groups.

Materials and Methods: A cross-sectional questionnaire-based study was conducted among 201 orthodontists and 201 patients. Validated questionnaires were distributed, comprising sections on demographics, knowledge, attitude, and practice related to orthodontic separators. Data were analysed using descriptive statistics and chi-square tests, with significance set at $p < 0.05$.

Results: Among orthodontists, 88.1% correctly identified the purpose of separators, with elastomeric separators being preferred by 51.2%. Pain/discomfort was the most common complication (51.2%). Among patients, 48.3% received adequate information from their orthodontist, whereas 28.4% were initially unaware. Regarding pain experience, 47.2% of patients reported moderate-to-severe pain, whereas only 4.5% of orthodontists considered it a significant issue. Overall patient satisfaction was 69.6%, although 51.2% reported separator dislodgement. Significant gaps were identified between orthodontists' perceptions and patients' experiences regarding discomfort management ($p = 0.003$) and educational needs ($p = 0.012$).

Conclusion: This study reveals notable discrepancies between orthodontist awareness and patient experiences regarding separator-related discomfort and education. Enhanced patient communication and standardised protocols may improve treatment compliance and satisfaction.

Keywords: Attitude; Knowledge; Orthodontic separators; Patient satisfaction

Introduction

Orthodontic separators represent fundamental adjuncts in contemporary fixed orthodontic therapy, serving the primary function of creating adequate interproximal space to facilitate the seamless placement of orthodontic bands on posterior teeth [1]. These devices, available in various forms including elastomeric rings, brass wire separators, and spring

separators (Kesling separators), are typically inserted between adjacent teeth approximately one week before band cementation [2]. The mechanical forces generated by these separators induce transient tooth movement, thereby establishing sufficient space for band accommodation [3].

Despite their clinical significance, orthodontic separators are frequently associated with patient discomfort, representing one of the initial pain experiences in orthodontic treatment [4]. Studies have demonstrated that separator placement can induce mild to moderate pain, with peak discomfort typically occurring within the first 24-48 hours post-insertion [5]. Bondemark et al. reported that patient-perceived pain from separators varies significantly based on separator type, placement technique, and individual pain thresholds [6].

The knowledge, attitude, and practice (KAP) framework provides a comprehensive approach to understanding health-related behaviors and clinical decision-making processes [7]. In orthodontics, KAP studies have been instrumental in identifying gaps between clinical recommendations and actual practice patterns [8]. However, comparative KAP assessments examining both orthodontists and patients regarding orthodontic separators remain notably scarce in the literature.

Previous investigations have predominantly focused on either clinical outcomes or patient pain perception in isolation, without simultaneously evaluating orthodontist perspectives and practices [9]. Normando et al. compared pain perception between brass wire and elastomeric separators but did not address the broader aspects of patient education and practitioner attitudes [10]. Furthermore, patient compliance with separator-related instructions and the adequacy of pre-procedural counseling have received insufficient attention in existing research [11].

The identification of perceptual and behavioral gaps between orthodontists and patients is crucial for developing patient-centered approaches that enhance treatment outcomes and satisfaction [12]. Understanding these discrepancies can inform the development of improved communication strategies and standardized educational protocols.

Therefore, this study aimed to evaluate and compare the knowledge, attitude, and practice regarding orthodontic separators among orthodontists and orthodontic patients, and to identify perceptual and behavioural gaps between the two groups in order to improve patient-centered orthodontic care.

Materials And Methods

Study Design and Setting

A cross-sectional, questionnaire-based study was conducted among orthodontists and orthodontic patients across multiple dental institutions and private practices. The study was carried out over a period of six months, from September 2024 to February 2025.

Sample Size Calculation

Sample size was calculated using the formula for cross-sectional studies: $n = Z^2pq/d^2$, where $Z = 1.96$, $p = 0.50$ (expected proportion), $q = 0.50$, and $d = 0.07$ (margin of error). The minimum required sample size was 196 per group; however, 201 participants were recruited in each group to account for potential incomplete responses.

Study Population

Orthodontist Group (n=201):

1. Inclusion criteria: Licensed orthodontists with minimum one year of clinical experience, currently practicing orthodontics in any clinical setting
2. Exclusion criteria: Orthodontists not currently involved in clinical practice, incomplete questionnaire responses

Patient Group (n=201):

1. Inclusion criteria: Patients aged ≥ 12 years who had undergone separator placement within the past six months as part of orthodontic treatment
2. Exclusion criteria: Patients with cognitive impairments, those unable to comprehend questionnaire content, syndromic patients

Study Instruments

Two separate validated questionnaires were developed for orthodontists and patients, respectively (Table 1). Content validity was established through expert review by five senior orthodontists, and reliability was assessed through pilot testing (Cronbach's alpha = 0.82 for orthodontist questionnaire; 0.79 for patient questionnaire).

Orthodontist Questionnaire (15 items):

1. Section A: Demographics (3 items)
2. Section B: Knowledge (5 items)
3. Section C: Attitude (4 items)
4. Section D: Practice (3 items)

Patient Questionnaire (14 items):

1. Section A: Demographics (2 items)

2. Section B: Knowledge (4 items)
3. Section C: Attitude (4 items)
4. Section D: Practice (4 items)

Data Collection Procedure

Questionnaires were distributed both electronically via Google Forms and as physical copies. For orthodontists, questionnaires were circulated through professional dental associations and academic institutions. Patient questionnaires were administered in waiting areas of orthodontic clinics following treatment appointments. All responses were anonymous and confidential.

Statistical Analysis

Statistical analysis was performed using JAMOVI version 2.6.25. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated for all variables. Chi-square tests were employed for comparing categorical variables between groups, with statistical significance set at $p < 0.05$.

Results

Demographic Characteristics

Among the 201 orthodontists surveyed, the majority (37.8%) were below 30 years of age, with 36.8% having 5-10 years of clinical experience. Practice settings were distributed across private practice (33.8%), academic institutions (33.3%), and hospital-based practice (23.9%). The patient sample comprised predominantly females (64.7%), with the majority aged 26-35 years (36.8%) and 18-25 years (35.8%). Complete demographic data are presented in Table 2.

Knowledge Assessment

Regarding separator purpose, 88.1% of orthodontists correctly identified space creation for band placement, demonstrating high knowledge levels. Elastomeric separators were considered most effective by 51.2% of practitioners. The recommended duration for separator placement was 5-7 days according to 40.8% and 3 days according to 36.3% of respondents.

Among patients, 48.3% reported receiving adequate explanation from their orthodontist, while 23.4% researched independently, and 28.4% either understood later or remained unaware. A notable 12.4% of patients did not know the type of separator used.

Attitude Evaluation

Orthodontist confidence levels were high, with 53.2% reporting being "very confident" and 26.4% "somewhat confident." Regarding the necessity of separators, 45.8% believed they are "sometimes" needed depending on the case, while 40.3% considered them "always" necessary. Patient discomfort was perceived as "acceptable" by 31.3%, requiring better management by 24.9%, and necessitating minimization by 39.3% of orthodontists.

Contrastingly, 47.2% of patients experienced moderate-to-severe pain following separator placement. Eating difficulties were reported by 84.1% of patients (slight to complete difficulty), and 51.2% experienced separator dislodgement at least once. The disparity between orthodontist perception and patient experience regarding discomfort was statistically significant ($\chi^2=14.23$, $p=0.003$). Knowledge and attitude comparison data are detailed in Table 3.

Practice Patterns

Among orthodontists, 79.6% used separators "always" or "often" in treatment planning. For discomfort management, 39.8% prescribed painkillers, 29.9% recommended dietary modifications, and 25.9% relied on patient reassurance. When separators failed to achieve adequate space, 42.3% switched separator type and 37.8% extended the wearing duration.

Patient responses revealed that 40.8% took painkillers for relief, while 21.4% modified their diet. Regarding separator dislodgement, 34.8% waited until their next appointment, 33.8% contacted their orthodontist immediately, and 13.4% ignored the issue. Overall satisfaction was positive, with 69.6% being satisfied or very satisfied. Practice patterns and satisfaction data are presented in Table 4.

Discussion

This cross-sectional study provides comprehensive insights into the knowledge, attitude, and practice patterns regarding orthodontic separators among both orthodontists and patients, revealing significant perceptual gaps warranting clinical attention. The findings underscore the importance of enhanced patient communication and standardized educational protocols in contemporary orthodontic practice.

The high level of knowledge demonstrated by orthodontists (88.1% correctly identifying separator

purpose) aligns with expected professional competency standards [13]. However, the preference for elastomeric separators (51.2%) over spring and brass wire variants differs from some previous studies that reported equivalent or superior space-gaining potential with metallic separators [14]. This preference may reflect considerations of ease of placement and patient comfort, as evidenced by 35.8% of orthodontists prioritizing patient comfort in separator selection.

A notable finding was the discrepancy between orthodontist-provided education and patient-received information. While 51.7% of orthodontists believed detailed patient education is necessary, only 35.3% of patients reported receiving detailed instructions. This gap ($\chi^2=8.76$, $p=0.012$) suggests a disconnect between perceived and actual communication effectiveness, consistent with findings by Keles et al. who reported similar communication barriers in orthodontic settings [15].

Pain perception represented the most significant area of disparity between groups. While 39.3% of orthodontists considered discomfort "should be minimized" and only 4.5% viewed it as a "significant issue," 47.2% of patients experienced moderate-to-severe pain. This finding corroborates earlier research by Ngan et al. who demonstrated that clinician estimates of patient discomfort frequently underestimate actual patient experiences [16]. The statistically significant difference ($p=0.003$) emphasizes the need for improved pain assessment protocols and empathetic patient counseling.

Separator dislodgement emerged as a prominent concern, with 51.2% of patients experiencing at least one episode, compared to only 21.9% of orthodontists identifying it as the most common complication. This discrepancy may reflect underreporting by patients during appointments or insufficient follow-up questioning by practitioners. Bergius et al. similarly noted that patient-reported complications often exceed clinician observations [17].

The finding that 13.4% of patients ignored separator dislodgement and 34.8% waited until their next appointment raises concerns about patient compliance and understanding of treatment protocols. This behavior could potentially compromise band placement and extend overall treatment duration. Improved pre-procedural counseling regarding

appropriate responses to separator loss may mitigate such issues [18].

Eating difficulties reported by 84.1% of patients (ranging from slight to complete difficulty) align with established literature on separator-associated functional impairment [19]. The management strategies employed by orthodontists, predominantly painkillers (39.8%) and dietary modifications (29.9%), correspond appropriately with current recommendations, though the limited use of topical gels (4.5%) may represent an underutilized comfort measure [20].

The patient survey revealed that spring separators (Kesling separators) were perceived as causing the most discomfort (29.4%), followed by brass wire separators (16.9%) and elastomeric separators (16.4%). This finding contrasts with orthodontist preferences, where elastomeric separators were favored for effectiveness and comfort. This discrepancy warrants further investigation into the relationship between separator type and patient-perceived discomfort [21].

Oral hygiene maintenance during separator wear presented challenges for a substantial proportion of patients, with 33.3% reporting difficulty or complete neglect of oral hygiene practices. This finding has implications for gingival health and treatment outcomes, suggesting the need for specific oral hygiene instructions during separator placement appointments [22].

Overall patient satisfaction (69.6% satisfied or very satisfied) was encouraging, though the 7.5% dissatisfaction rate warrants attention. Interestingly, patients who received detailed instructions demonstrated higher satisfaction scores, supporting the hypothesis that enhanced communication improves treatment experience. This association has been documented across various dental procedures and reinforces the value of patient education [23].

The study has certain limitations. The cross-sectional design precludes causal inferences, and self-reported data may be subject to recall bias. Additionally, the sample may not be fully representative of all geographic and demographic populations. Future longitudinal studies incorporating objective pain measurements and standardized educational interventions would strengthen these findings [24].

Conclusion

This study reveals significant gaps between orthodontist perceptions and patient experiences regarding orthodontic separators, particularly concerning pain assessment, complication recognition, and educational adequacy. While orthodontists demonstrated appropriate theoretical knowledge, the translation of this knowledge into effective patient communication and expectation management appears suboptimal. The finding that nearly half of patients experienced moderate-to-severe discomfort, while few orthodontists considered it a significant concern, highlights an important area for clinical improvement.

Enhanced pre-procedural counseling, standardized pain management protocols, and clear instructions regarding separator dislodgement management are recommended. The questionnaires developed in this study may serve as useful tools for future KAP assessments in orthodontic settings. Bridging these perceptual gaps through improved communication strategies may significantly enhance patient compliance, treatment efficiency, and overall satisfaction in orthodontic care. Future research should focus on developing and validating educational interventions to address these identified deficiencies.

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Table

Table 1: Study Questionnaires for Orthodontists and Patients

PART A: ORTHODONTIST SURVEY
Section A: Demographics
1. Age Group: A) Below 30; B) 30-35; C) 36-45; D) 46-55; E) Above 55
2. Years of Experience as an Orthodontist: A) Less than 5 years; B) 5-10 years; C) 11-20 years; D) More than 20 years
3. Type of Practice: A) Private Practice; B) Academic/Teaching Institution; C) Hospital-Based Practice; D) Corporate Dental Chain; E) Other
Section B: Knowledge of Orthodontic Separators
4. What is the primary purpose of using orthodontic separators? A) To create space for band placement; B) To correct malocclusion; C) To improve patient comfort; D) I don't know
5. What type of separator do you find most effective in achieving adequate space? A) Elastomeric separators; B) Brass wire separators; C) Spring separators (Kesling separators); D) Choice varies depending on clinical indication
6. How long should separators typically remain in place before band placement? A) 1 day; B) 3 days; C) 5-7 days; D) More than a week
7. What is the most common complication you observe with separators? A) Pain or discomfort; B) Gingival inflammation; C) Separator dislodgement; D) Difficulty in eating
8. Which factor most influences your choice of separator? A) Ease of placement; B) Patient comfort; C) Effectiveness; D) Cost

Section C: Attitude Toward Separator Use
9. How confident are you in your knowledge about separators? A) Very confident; B) Somewhat confident; C) Neutral; D) Not confident
10. Do you believe separators are necessary before band placement? A) Yes, always; B) Sometimes, depending on the case; C) Rarely; D) No, other methods are better
11. How do you perceive patient discomfort due to separators? A) Acceptable as part of treatment; B) Needs better management; C) Should be minimized as much as possible; D) A significant issue in orthodontics
12. Do you believe patients should be educated more about separators before placement? A) Yes, detailed explanation is necessary; B) A brief explanation is enough; C) No, it's not needed; D) Not sure
Section D: Practice of Separator Use
13. How often do you use separators in your treatment planning? A) Always; B) Often; C) Sometimes; D) Rarely
14. What is your preferred method to manage patient discomfort with separators? A) Prescribing painkillers; B) Dietary modifications; C) Reassuring the patient; D) Using topical gels
15. How do you manage cases where separators fail to achieve adequate space? A) Switching separator type; B) Leaving them in for a longer period; C) Using mechanical aids; D) No failures observed
PART B: PATIENT SURVEY
Section A: Patient Demographics
1. Age Group: A) Below 18; B) 18-25 years; C) 26-35 years; D) 36-50 years; E) Above 50 years
2. Gender: A) Male; B) Female; C) Prefer not to say
Section B: Knowledge of Orthodontic Separators
3. Were you aware of the purpose of separators before they were placed? A) Yes, explained by my orthodontist; B) Yes, researched myself; C) No, understood later; D) No, still don't know
4. Which type of separator did your orthodontist use for you? A) Elastomeric separators; B) Spring separators (Kesling separators); C) Brass wire separator; D) I don't know
5. How long did your separators stay in place before your next appointment? A) 1 day; B) 3 days; C) 5-7 days; D) More than a week
6. Did your orthodontist provide instructions on how to manage discomfort with separators? A) Yes, detailed instructions; B) Yes, basic instructions; C) No, I had to ask for guidance; D) No instructions were given
Section C: Attitude Toward Separator Use
7. How would you describe the pain or discomfort after separator placement? A) No pain; B) Mild pain; C) Moderate pain; D) Severe pain
8. Did you face any issues like separators falling out before your next appointment? A) Yes, multiple times; B) Yes, once or twice; C) No, they stayed in place; D) I don't remember
9. How difficult was it to eat with separators? A) No difficulty; B) Slight difficulty; C) Significant difficulty; D) Couldn't eat properly at all
10. Which separator do you think caused more discomfort? A) Elastic separators; B) Kesling separators; C) Brass wire separator; D) All equally uncomfortable; E) No discomfort at all

Section D: Practice of Separator Use	
11. Were you able to maintain your oral hygiene while wearing separators? A) Yes, no issues; B) Yes, but it was difficult; C) No, hard to clean properly; D) Didn't focus on oral hygiene	
12. Did you take any steps to relieve discomfort from separators? A) Took painkillers; B) Changed my diet; C) Used home remedies; D) Did nothing	
13. If your separator fell out, what did you do? A) Contacted my orthodontist immediately; B) Waited until my next appointment; C) Tried to put it back myself; D) Ignored it	
14. How satisfied were you with your overall experience with separators? A) Very satisfied; B) Satisfied; C) Neutral; D) Dissatisfied	

Table 2: Demographic Characteristics of Study Participants

Parameter	Category	Orthodontists n (%)	Patients n (%)
Age	Below 18/Below 30	76 (37.8%)	15 (7.5%)
	18-25/30-35	41 (20.4%)	72 (35.8%)
	26-35/36-45	41 (20.4%)	74 (36.8%)
	36-50/46-55	32 (15.9%)	34 (16.9%)
	Above 50/55	11 (5.5%)	6 (3.0%)
Gender	Female	-	130 (64.7%)
	Male	-	61 (30.3%)
	Prefer not to say	-	10 (5.0%)
Years of Experience	<5 years	69 (34.3%)	-
	5-10 years	74 (36.8%)	-
	11-20 years	44 (21.9%)	-
	>20 years	14 (7.0%)	-
Practice Type	Private Practice	68 (33.8%)	-
	Academic/Teaching	67 (33.3%)	-
	Hospital-based	48 (23.9%)	-
	Corporate Dental Chain	10 (5.0%)	-
	Other	8 (4.0%)	-

Table 3: Knowledge and Attitude Comparison Between Orthodontists and Patients

Parameter	Category	Orthodontists n (%)	Patients n (%)	p-value
KNOWLEDGE DOMAIN				
Awareness of Separator Purpose	Correct understanding	177 (88.1%)	144 (71.6%)*	0.008
	Incorrect/Unknown	24 (11.9%)	57 (28.4%)	

Type of Separator Preferred/Used	Elastomeric	103 (51.2%)	79 (39.3%)	0.124
	Spring/Kesling	44 (21.9%)	82 (40.8%)	
	Brass wire	29 (14.4%)	15 (7.5%)	
	Unknown/Varies	25 (12.4%)	25 (12.4%)	
Duration of Separator Placement	1 day	18 (9.0%)	19 (9.5%)	0.087
	3 days	73 (36.3%)	52 (25.9%)	
	5-7 days	82 (40.8%)	90 (44.8%)	
	>1 week	28 (13.9%)	40 (19.9%)	
Most Common Complication	Pain/discomfort	103 (51.2%)	95 (47.2%)**	0.034
	Dislodgement	44 (21.9%)	103 (51.2%)*	
	Eating difficulty	24 (11.9%)	77 (38.3%)*	
	Gingival inflammation	30 (14.9%)	-	
Instructions Provided/Received	Yes, detailed	104 (51.7%)†	71 (35.3%)	0.012
	Yes, basic	73 (36.3%)	55 (27.4%)	
	No/Had to ask	24 (12.0%)	75 (37.3%)	
ATTITUDE DOMAIN				
Confidence Level/Pain Experience	Very confident/No pain	107 (53.2%)	20 (10.0%)	0.003
	Somewhat confident/Mild	53 (26.4%)	86 (42.8%)	
	Neutral/Moderate	31 (15.4%)	69 (34.3%)	
	Not confident/Severe	10 (5.0%)	26 (12.9%)	
Perception of Discomfort	Significant issue	9 (4.5%)	26 (12.9%)††	0.003
	Needs management	50 (24.9%)	69 (34.3%)	
	Acceptable/Mild	63 (31.3%)	86 (42.8%)	
	Should be minimized/None	79 (39.3%)	20 (10.0%)	
Separator Dislodgement Issues	Multiple times	-	23 (11.4%)	-
	Once or twice	-	80 (39.8%)	
	Stayed in place	-	72 (35.8%)	
	Don't remember	-	26 (12.9%)	
Eating Difficulty	No difficulty	-	32 (15.9%)	-

	Slight difficulty	-	92 (45.8%)	
	Significant difficulty	-	49 (24.4%)	
	Couldn't eat at all	-	28 (13.9%)	

*Includes those explained by orthodontist and self-researched; **Moderate to severe pain; ***Separator fell out at least once; ****Significant difficulty or couldn't eat properly; †Orthodontist response indicating detailed explanation is necessary; ††Severe pain reported

Chi-square test; significance at p<0.05.

Table 4: Practice Patterns and Satisfaction Comparison Between Orthodontists and Patient

Parameter	Category	Orthodontists n (%)	Patients n (%)	p-value
PRACTICE DOMAIN				
Frequency of Separator Use	Always	84 (41.8%)	-	-
	Often	76 (37.8%)	-	
	Sometimes	32 (15.9%)	-	
	Rarely	9 (4.5%)	-	
Discomfort Management Method	Painkillers	80 (39.8%)	82 (40.8%)	0.456
	Dietary modifications	60 (29.9%)	43 (21.4%)	
	Reassurance/Home remedies	52 (25.9%)	44 (21.9%)	
	Topical gels/Nothing	9 (4.5%)	32 (15.9%)	
Management of Separator Failure	Switch separator type	85 (42.3%)	-	-
	Leave longer	76 (37.8%)	-	
	Use mechanical aids	24 (11.9%)	-	
	No failures observed	16 (8.0%)	-	
Response to Separator Falling Out	Contacted orthodontist	-	68 (33.8%)	-
	Waited for next visit	-	70 (34.8%)	
	Tried to put back	-	36 (17.9%)	
	Ignored it	-	27 (13.4%)	
Oral Hygiene Maintenance	Yes, no issues	-	66 (32.8%)	-
	Yes, but difficult	-	68 (33.8%)	
	Hard to clean properly	-	42 (20.9%)	
	Didn't focus on hygiene	-	25 (12.4%)	

Separator Causing Most Discomfort	Spring/Kesling	-	59 (29.4%)	-
	Brass wire	-	34 (16.9%)	
	Elastomeric	-	33 (16.4%)	
	All equally uncomfortable	-	47 (23.4%)	
	No discomfort at all	-	28 (13.9%)	
SATISFACTION DOMAIN				
Overall Confidence/Satisfaction	Very confident/Very satisfied	107 (53.2%)	75 (37.3%)	0.018
	Somewhat confident/Satisfied	53 (26.4%)	65 (32.3%)	
	Neutral	31 (15.4%)	46 (22.9%)	
	Not confident/Dissatisfied	10 (5.0%)	15 (7.5%)	
Need for Patient Education	Detailed explanation needed	104 (51.7%)	-	-
	Brief explanation enough	73 (36.3%)	-	
	Not needed	15 (7.5%)	-	
	Not sure	9 (4.5%)	-	
Necessity of Separators	Always needed	81 (40.3%)	-	-
	Sometimes needed	92 (45.8%)	-	
	Rarely needed	17 (8.5%)	-	
	Other methods better	11 (5.5%)	-	
Factor Influencing Separator Choice	Patient comfort	72 (35.8%)	-	-
	Effectiveness	64 (31.8%)	-	
	Ease of placement	53 (26.4%)	-	
	Cost	12 (6.0%)	-	